NORTHEAST ELECTRONICS

A DIVISION OF NORTHERN TELECOM, INC.

INSTRUCTION MANUAL

TTS 35B/BAQ

NOTCH FILTER MODIFICATION PROCEDURE

No. A0035-20-601 ISSUE 1 DATE JAN 1977

PRINTED IN U.S.A.

Airport Rd., Concord, N.H. 03301 • (603) 224-6511 • TELEX 94-3453

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TTS 35B AND TTS 35BAQ NOTCH FILTER

MODIFICATION PROCEDURE

INTRODUCTION. This procedure provides the information required to install a notch filter in either a TTS 35B or a TTS 35BAQ. A calibration procedure is also included.

1. Remove notch filter modification kit components from packing material and check against Figure 1 to ensure that all components have been received and are in an undamaged condition.

2. On front panel, loosen four captive screws in corners and remove chassis from cover.

3. Disconnect power connector between cover battery pack and chassis.

4. Remove the two screws holding PC board A0004-20-020 and reposition board back against front panel. See Figure 6 for location of board.

5. Unsolder + end of C3 and bend capacitor down to gain access to PC bracket mounting screw. See Figure 4 for location of C3 and bracket.

6. Remove the four screws securing mounting bracket to side braces.

7. On QRMS Detector board PC4, remove the nine wires secured by quick disconnects. See Figure 8.

8. On PC1, remove three quick disconnects in left-hand corner. See Figure 4.

9. Remove the two 3/8-inch nuts securing PC4 to meter and remove board.

10. Remove the four 1/4-inch nuts securing meter and remove meter.

11. Two screws are now exposed on front panel just above meter hole. Remove the two screws.

12. Lift the PC1, PC2 and mounting bracket assembly toward top of the unit to free it from the side braces. When free, rotate the entire assembly toward the front panel. This will straighten the main wire harness connecting the assembly and give access to the section of the front panel where the notch filter control switch is to be located.

13. Newer units have a plugged hole in the front panel. See Figure 2 for its location. If present, remove plug and continue with step 17. If there is no plug, continue with step 14.

14. See Figure 2 to locate and mark hole to be drilled.

15. Use a punch to mark a deep hole at the center indicated. This will keep the drill from wandering when drilling is started.

CAUTION

Ensure that all wires at the rear of the front panel are clear of the drilling area.

16. Drill at 15/32-inch hole and deburr.

17. Insert notch filter control switch through hole just drilled. Orient switch so that white shorting strap on switch points toward top of front panel. See Figure 5.

18. Put cover plate over switch and secure switch and cover plate with washer and nut provided. Leave the star washer behind front panel.

19. At rear of notch filter control switch, dress wire bundle straight out from switch and then cut plastic cable wrap. Remove ground lug and set aside.

20. To reduce crosstalk, it is recommended that interconnection wiring to S5, J3 and J4 be modified. See Figure 4 for location of these components and Figure 11 for the associated wiring. Newer units will not require this rewiring.

21. Remove notch filter board from mounting bracket.

22. Remove and discard screws that secure hold coils L1 and L2. See Figure 4.

23. Install notch filter mounting bracket to L1 and L2. Use the longer screws provided. See Figure 4.

24. Mount and secure notch filter board to the mounting bracket. Use fiber washers between board and mounting studs. See Figure 4.

25. On S8, unsolder and remove wire connecting deck 5 wiper to deck 6 terminal 10. See Figure 5 for location of S8 and terminal identification.

26. Route shielded wires 1 and 2 to the left under side brace and then solder to S8 as shown on Figure 5.

27. Route shielded wires 3 and 4 as shown on Figure 5 and solder to notch filter board.

28. Solder black shield wires on shielded wires 2 and 4 to the ground lug provided. See Figure 5.

29. On notch filter control switch, locate the two white wires. Route them to S9 and solder to any of the terminals 1 through 5 on deck 5. See Figure 6.

30. On notch filter control switch, locate the white-orange wire. Solder it to B1 on PC2. See Figure 6.

31. Reposition PC1-PC2 assembly between side braces and secure with the two screws through front panel.

CAUTION

Be careful not to pinch any wires between mounting brackets and front panel. Check to see that all socket-mounted transistors on PC1 and PC2 are seated.

32. Secure PC1-PC2 assembly to side braces with four screws.

33. Resolder the + end of C3 to its mounting terminal.

34. Install meter and secure with four 1/4-inch nuts. Be sure to mount the two ground lugs to any of the four screws on meter.

35. Install PC4 on rear of the meter and secure with two 3/8-inch nuts. See Figure 7.

36. Some older units may have the wiring to PC4 routed as shown on Figure 7. If this is the case, reroute the wiring through openings A and B as shown on Figures 7 and 8.

37. Reconnect the three wires to PC1 as shown on Figure 4.

38. Reconnect the nine wires to PC4 as shown on Figure 8. All loose wires in the unit should now be connected.

39. Solder a red-white wire from pin 3 on the right side of notch filter board to B2 on PC2. See Figure 5.

40. Connect a black wire from the GND pin on notch filter board to the GND pin on PC2. See Figure 5.

41. Modify the interconnection wiring between CB3, J5, and S12 as shown on Figure 9. This includes adding diode CR3. Newer units will not require this modification.

42. If the unit has an older type PC2 board, remove all shaded parts indicated on Figure 10 and mount and solder PC 96643. Be sure to connect the white wire from PC 96643 to PC2-B2 as shown.

43. For newer PC2 boards, remove the 3W, 750-ohm resistor shown on Figure 6.

44. All units must have R10 added to S12 as shown on Figure 6.

45. Using Figure 6, locate the white-orange wire between S12 pin 8 and PC2 pin B1. Cut this wire at PC2 pin B1.

46. Splice the end of the wire cut in step 45 to the white-orange wire provided. Cover the splice with a length of shrink tubing and heat.

47. Route the white-orange wire as shown on Figure 6 and solder to the wiper on S9, deck 5.

48. This completes the modification portion of the procedure. Check to ensure that there are no unconnected wires, solder bridges, or solder splashes.

49. The following test equipment or equivalent is required for calibration.

a. Audio Oscillator with 600-ohm output such as HP 200CD.

b. Frequency Counter such as HP 5300A.

c. Ac Voltmeter with a high input impedance and calibrated to indicate dBm into 600 ohms such as HP400EL/FL.

d. If the battery pack is not used, a 48 Vdc power supply will be required.

50. Set the TTS 35B/BAQ controls as follows.

a. SEND ADJ control fully counterclockwise to OFF.

b. FILTER switch to 15KC (black lettering).

c. REC IMP & TERM B switch to 600 ohms.

d. LINE switch to REC A-SEND B.

e. FUNCTION switch to 2 WIRE (LA).

f. INPUT switch to TERM.

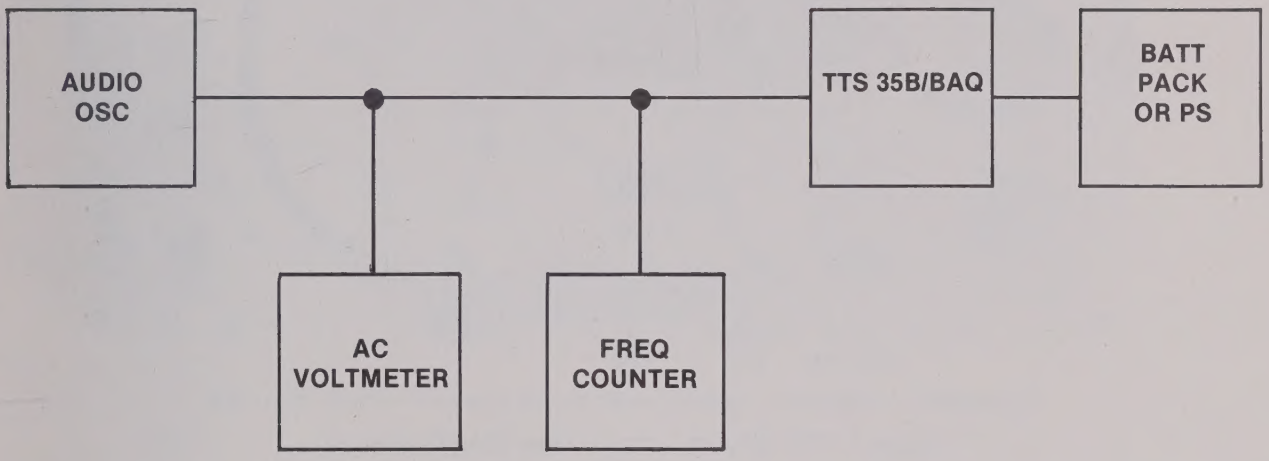
g. EXT CKT OR TEL SET switch to MEAS A AND B.

h. Both SENS switches to 0 DBM (black lettering).

i. NOTCH FILTER switch to OUT.

j. All other switches in any position.

51. Connect the equipment as shown below.



52. Set POWER switch to either BATT or 48V as appropriate.

53. Push BATT TEST button and observe meter. It must indicate in green GOOD sector.

54. Adjust audio oscillator frequency to 1700 ± 10 Hz and output level to 0 ± 0.05 dBm.

55. The TTS 35B/BAQ meter should indicate 0 ± 0.1 dBm. If it is not within this range, adjust R308 on PC2 to obtain an indication of 0 dBm on the meter.

56. Set NOTCH FILTER switch to IN.

57. On notch filter board, adjust R9 to obtain an indication of 0 dBm on the meter.

58. Adjust audio oscillator frequency to 1010 ± 10 Hz.

59. Set lower SENS switch to −50 DBM (black lettering).

60. The meter must indicate less than 0.

61. Disconnect all equipment.

62. Insert chassis into cover and secure with four screws.

NOTCH FILTER DESCRIPTION. As shown on Figure 12, the notch filter is located between the 10 dB per step attenuator and amplifier 1. It can be used with any of the other filters in the unit. The notch filter provides at least 50 dB of rejection from 995 to 1025 Hz and allows noise to be measured in the presence of a tone. See Figure 13 for a schematic diagram of the notch filter. As can be seen, the band reject notch filter is designed to be used with 600-ohm input and output impedances. Amplifier U1 operates at unity gain and provides the required high input impedance. Transistors Q1 and Q2 provide enough gain to overcome the insertion loss of the passive filter assembly. Potentiometer R9 calibrates the gain. Transistor Q3 is an emitter follower-type voltage regulator that helps keep voltage variations from affecting the gain of the amplifier stages.

VOLTAGE REGULATOR DESCRIPTION. In the older units, this assembly is added to the existing power supply during the modification. Newer units have this function already incorporated into its design. As seen on Figure 15, the assembly is a simple series pass regulator. Zener diode CR1 provides a reference voltage of 5.6 Vdc that is applied to the non-inverting input of operational amplifier U1. The ratio of resistors R3 and R4 sets the regulated output voltage at approximately −12 Vdc. Series pass element Q1 provides the current gain to supply the required output current. Transistor Q2 and resistor R2 limit the output current to a safe level.

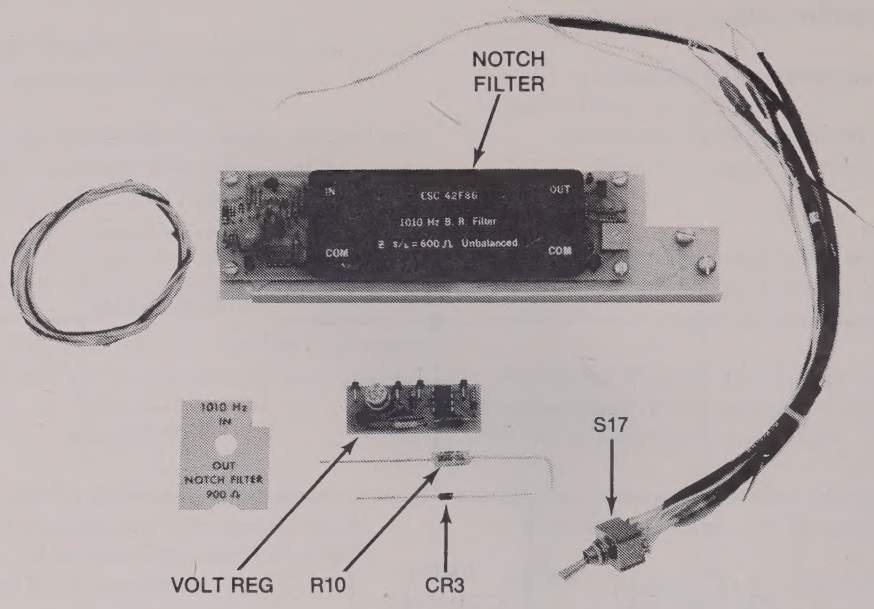


Figure 1. TTS 35B/BAQ Notch Filter Modification Kit.

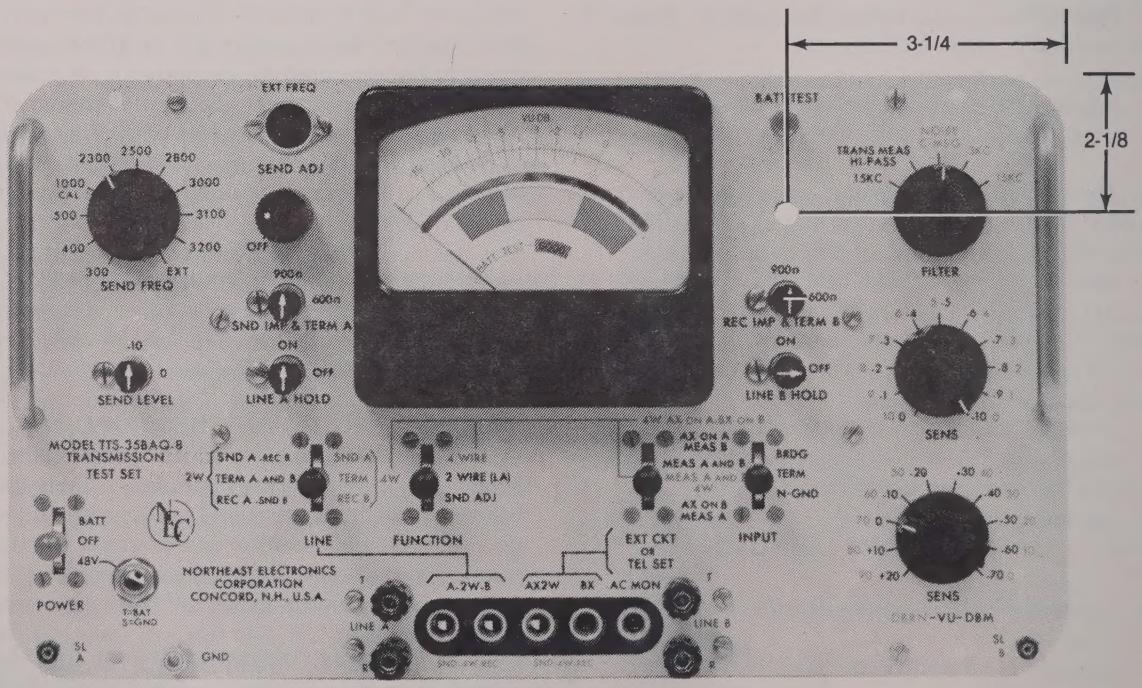


Figure 2. Notch Filter Control Switch, Hole Locating Diagram.

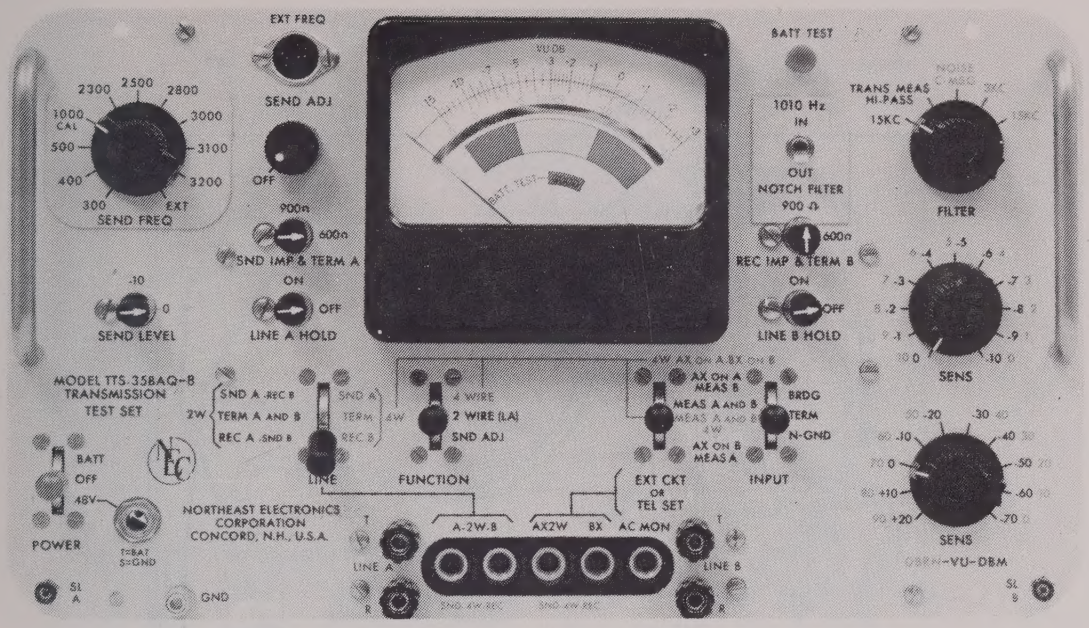


Figure 3. Cover Plate and Notch Filter Switch, Completed Installation.

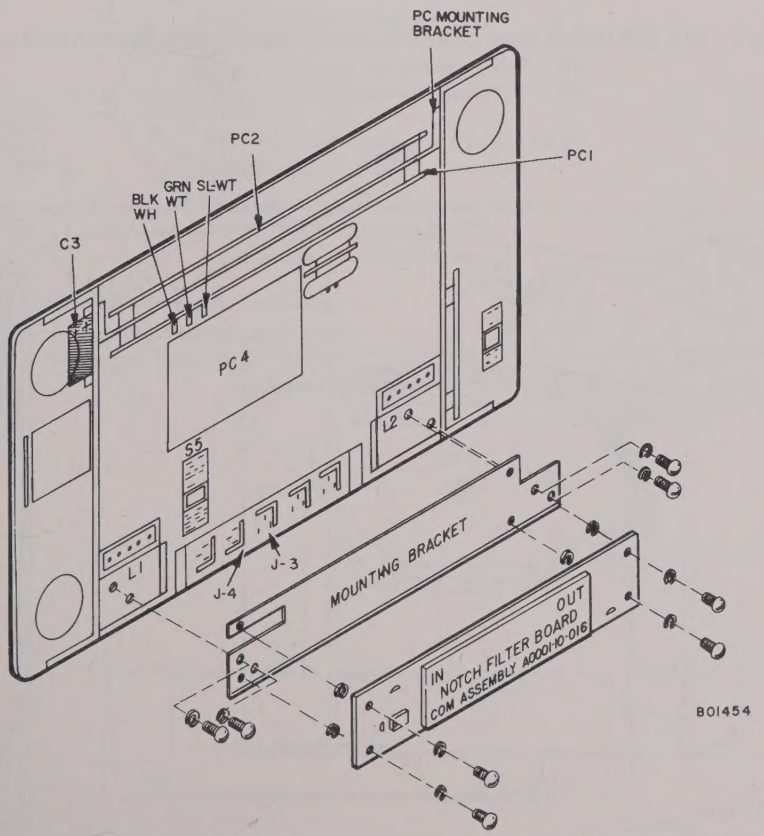


Figure 4. TTS 35B/BAQ Rear View, Assembly Location.

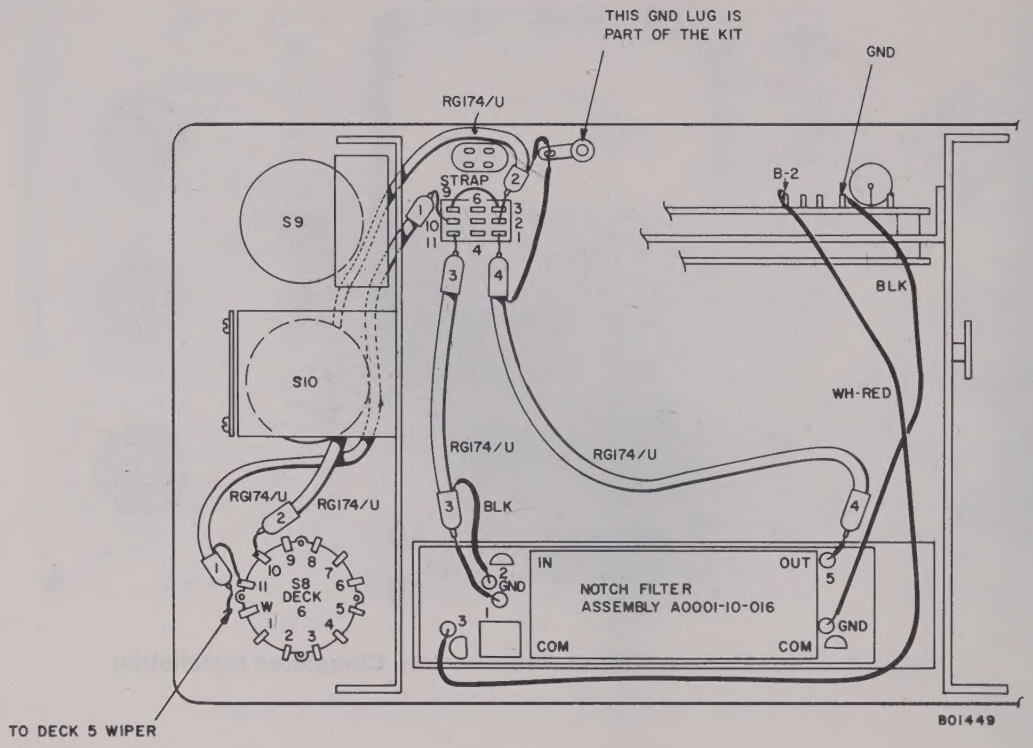


Figure 5. TTS 35B/BAQ Rear View, Notch Filter Control Switch Shielded Wiring.

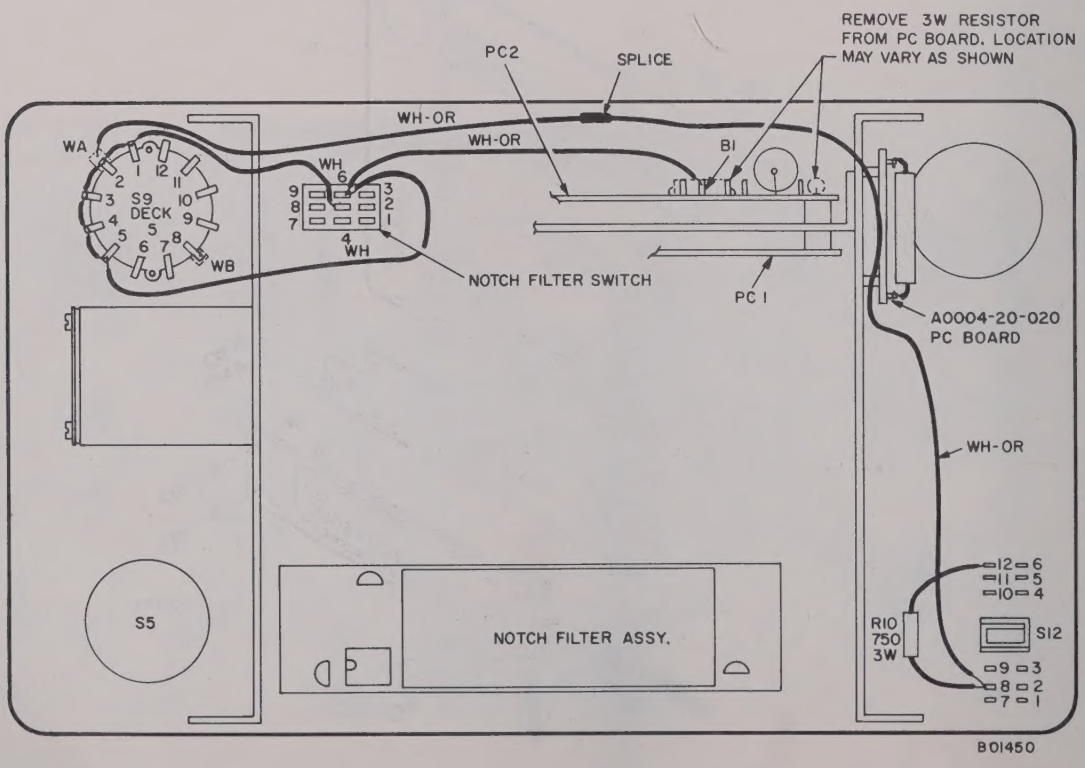


Figure 6. TTS 35B/BAQ Rear View, Notch Filter Control Switch Wiring.

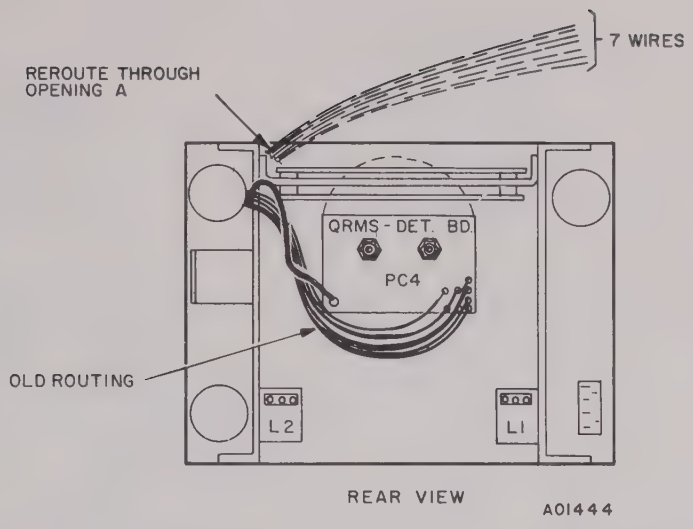


Figure 7. QRMS Detector Board Wire Routing In Older Units.

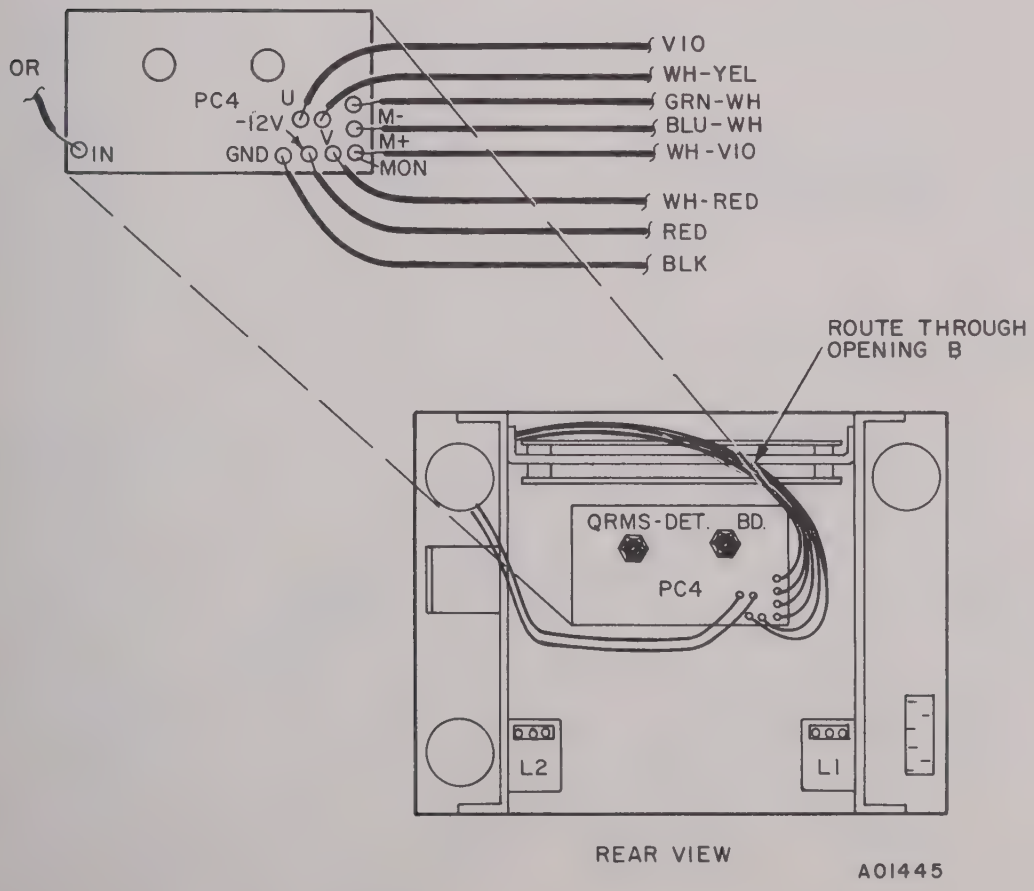


Figure 8. New Wire Routing For QRMS Detector Board.

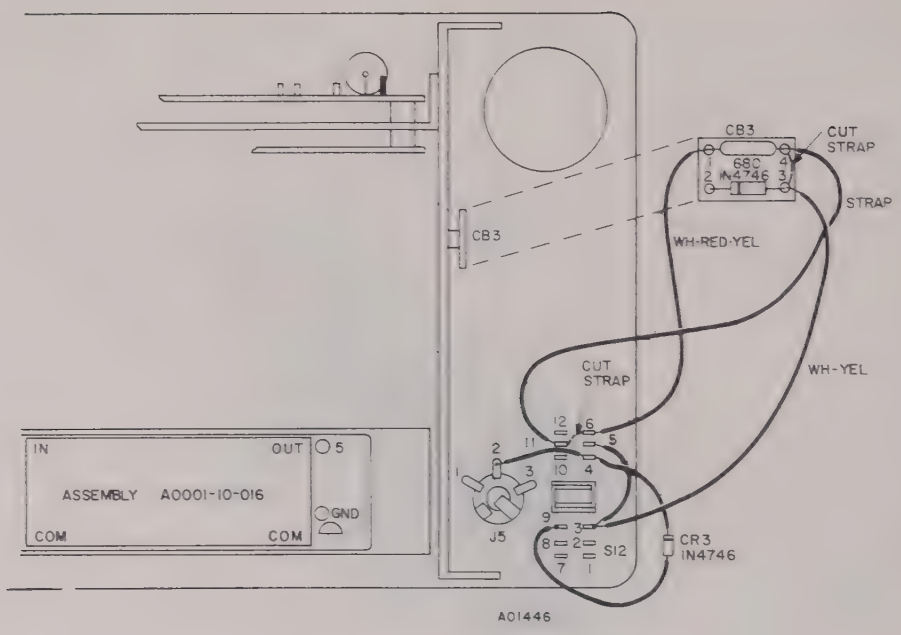


Figure 9. J5, S12, and CB3 Wiring Modification.

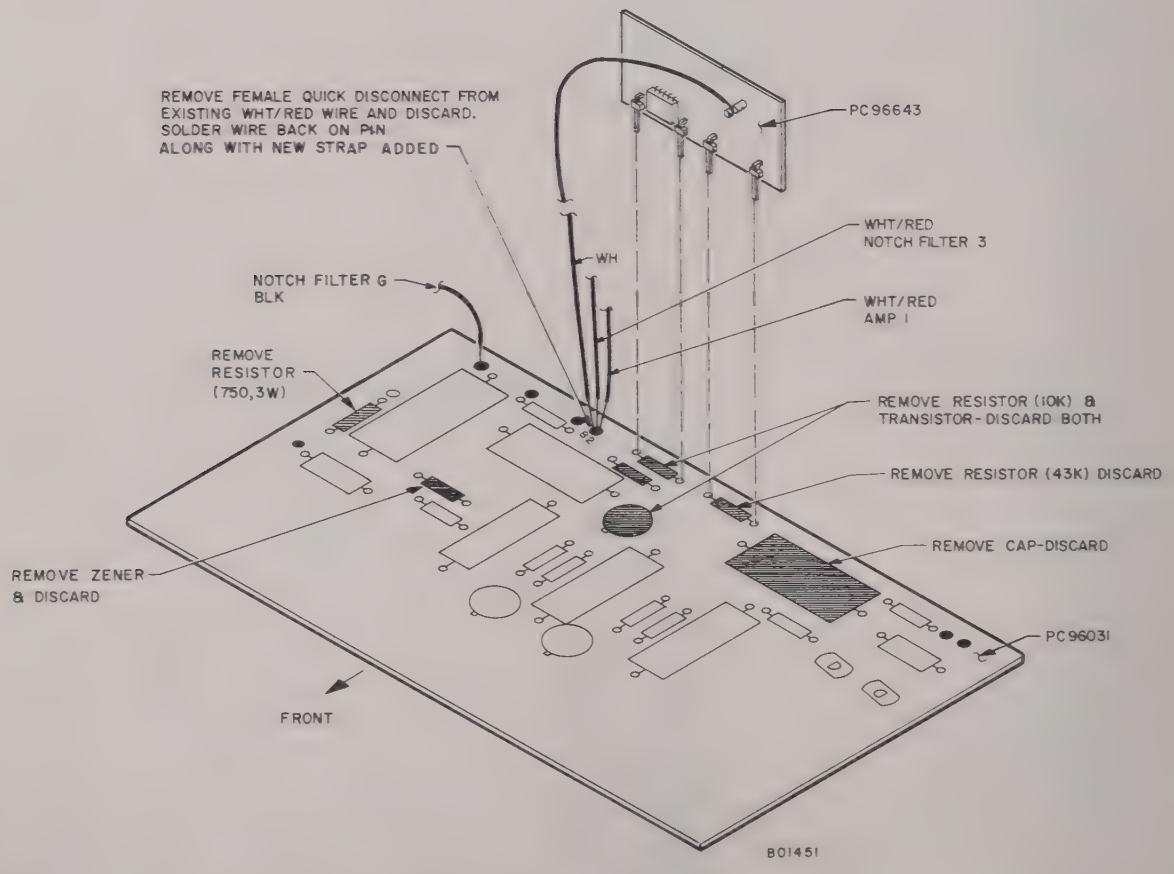


Figure 10. PC2 Modification On Older Units.

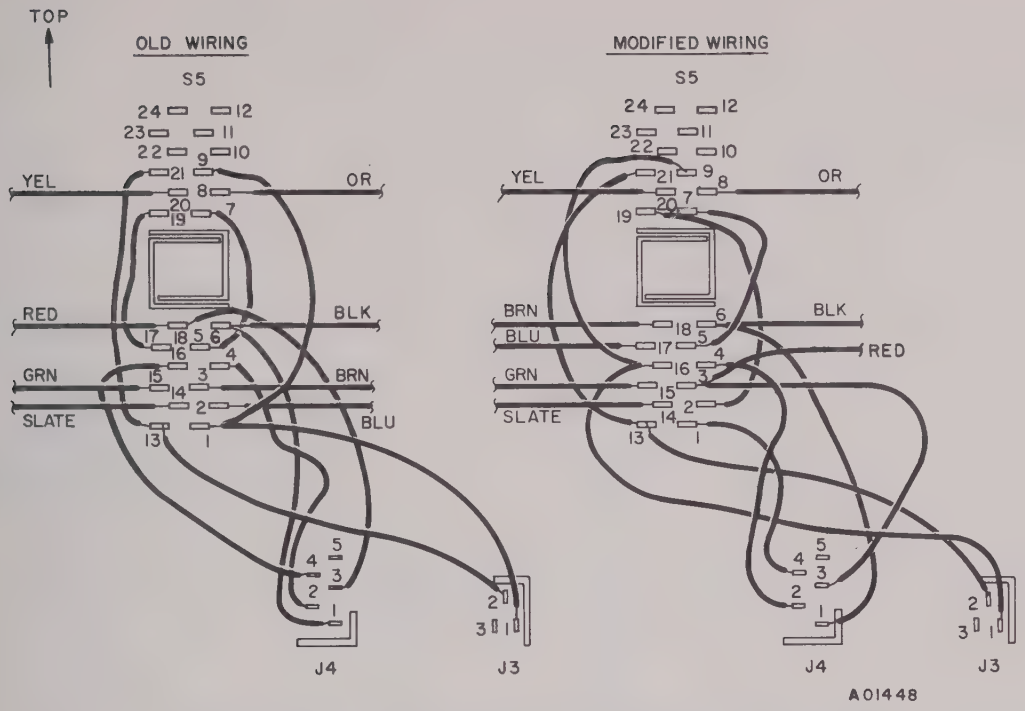


Figure 11. S5, J4, and J3 Wiring Modification On Older Units.

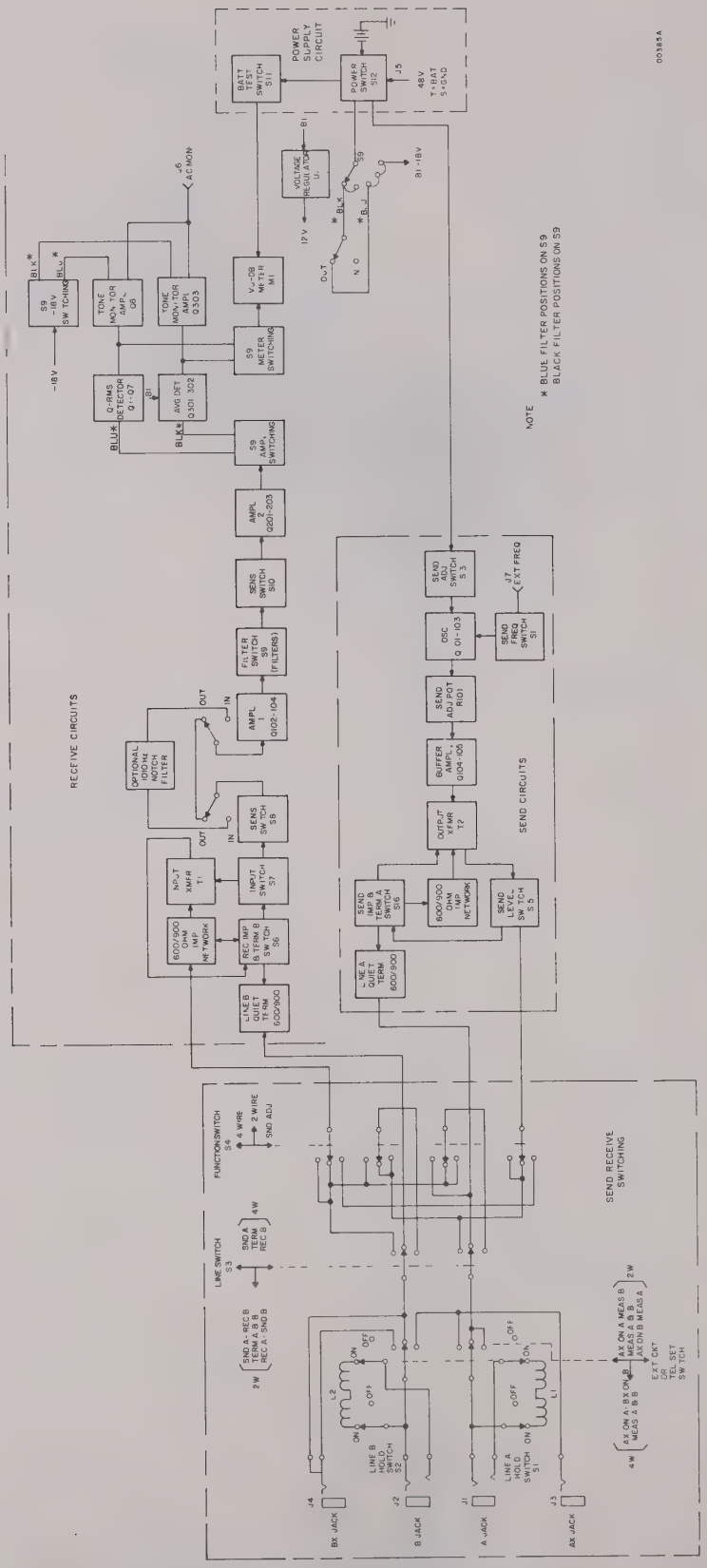
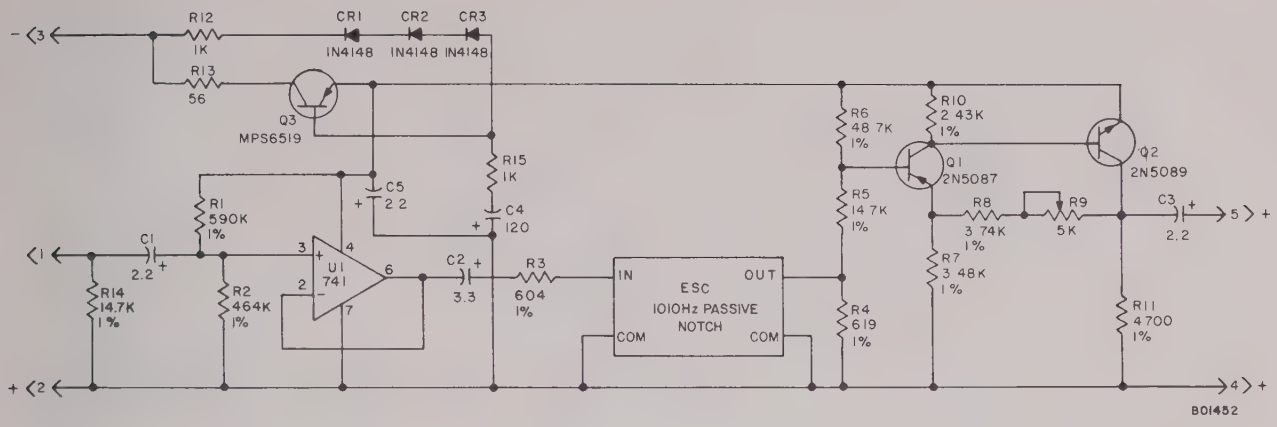


Figure 12. TTS 35B/BAQ With Notch Filter, Block Diagram.



NOTE:
UNLESS OTHERWISE INDICATED:
ALL CAPACITOR VALUES ARE IN MICROFARADS.
ALL RESISTOR VALUES ARE IN OHMS.

Figure 13. 1010 Hz Notch Filter Schematic Diagram.

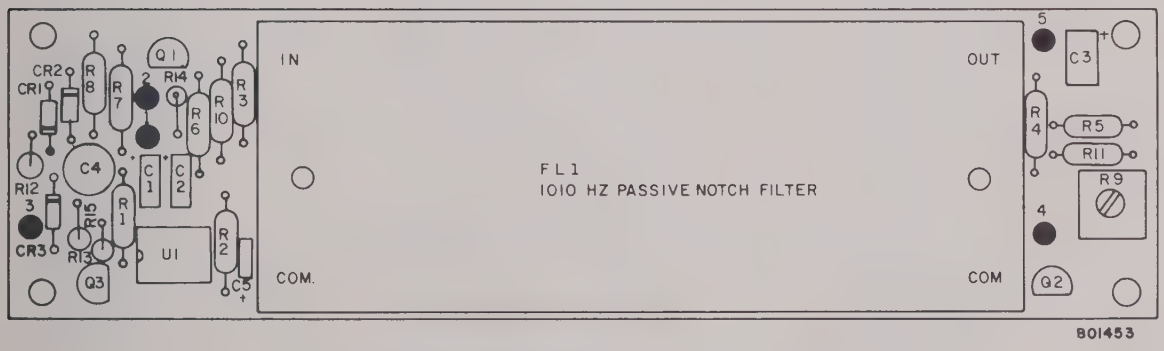


Figure 14. 1010 Hz Notch Filter Parts Location.

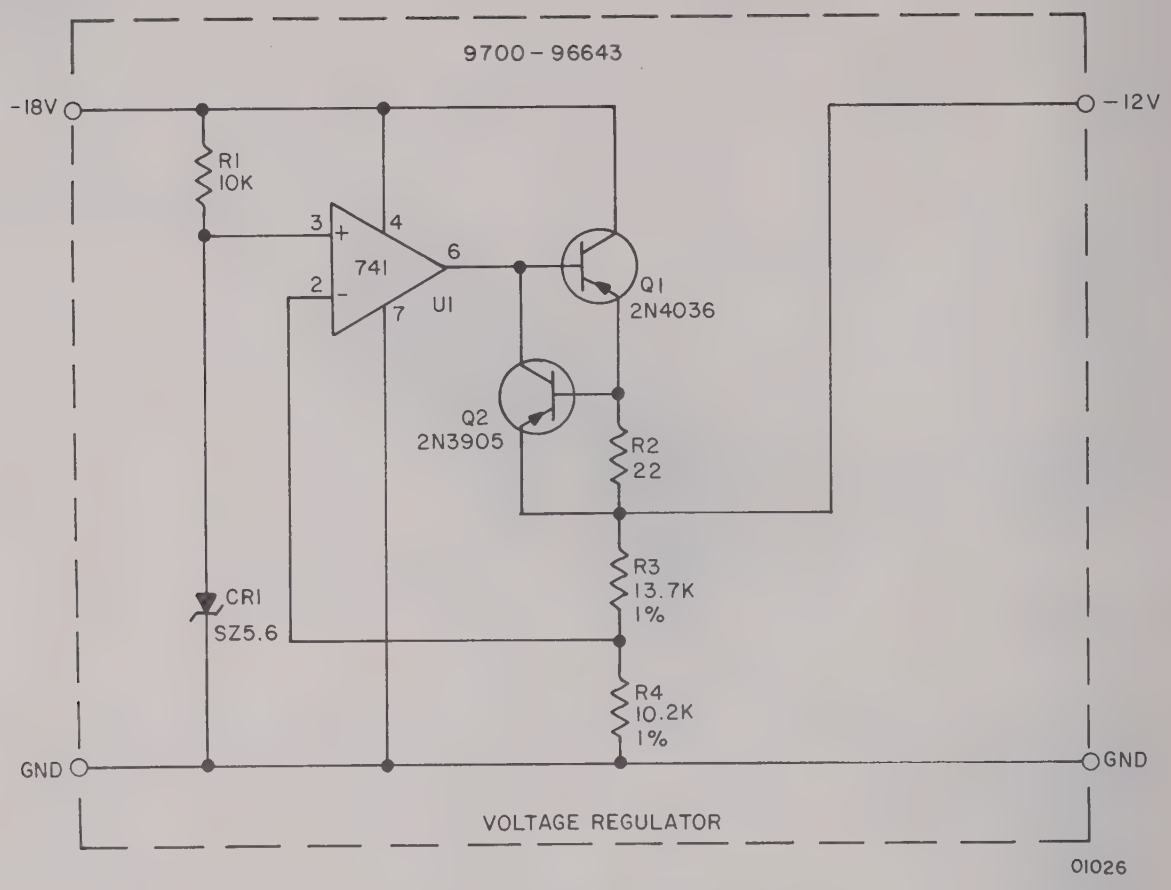


Figure 15. Voltage Regulator Schematic Diagram.

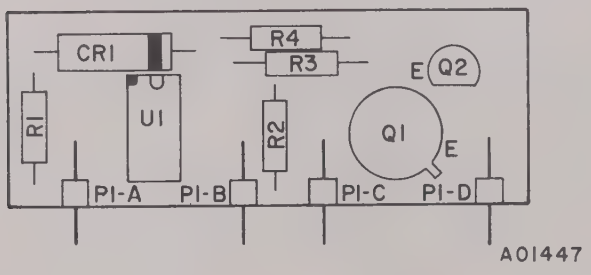


Figure 16. Voltage Regulator Parts Location.

Table 1. Notch Filter Modification Kit Overall Parts List.

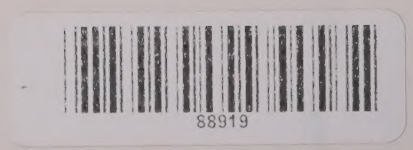
Ref. Desig.	Description	Part No.
CR3	Diode, 1N4746	562004746
R10	Resistor, 750, 5%, 3 w	210307515
S17	Switch, 3PDT	620401200
	Notch Filter Assembly	C00110016
	Voltage Regulator Assembly	B003527021
	Plate, panel detail	

Table 2. Notch Filter Parts List.

Ref. Desig.	Description	Part No.
C1, C3, C5	Capacitor, 2.2 UF, 10%, 35V	310002250
C2	Capacitor, 3.3 UF, 10%, 25V	310003350
C4	Capacitor, 120 UF, 10%, 15V	310801270
CR1-CR3	Diode, 1N4148	560041480
FL1	Notch filter, 1010 Hz	470100700
Q1	Transistor, 2N5087	552050870
Q2	Transistor, 2N5089	550050890
Q3	Transistor, MPS6519	552065190
R1	Resistor, 590 k, 1%, 1/8 w	220259031
R2	Resistor, 464 k, 1%, 1/8 w	220246431
R3	Resistor, 604, 1%, 1/8 w	220260401
R4	Resistor, 619, 1%, 1/8 w	220261901
R5, R14	Resistor, 14.7 k, 1%, 1/8 w	220214721
R6	Resistor, 48.7 k, 1%, 1/8 w	220248721
R7	Resistor, 3.48 k, 1%, 1/8 w	220234811
R8	Resistor, 3.74 k, 1%, 1/8 w	220237411
R9	Resistor, 5 k pot, 10%, 1/2 w	232705023
R10	Resistor, 2.43 k, 1%, 1/8 w	220224311
R11	Resistor, 4.7 k, 1%, 1/8 w	220247011
R12, R15	Resistor, 1 k, 10%, 1/4 w	200101026
R13	Resistor 56, 10%, 1/4 w	200105606
U1	Op amp, LM741	500007412

Table 3. Voltage Regulator Parts List.

Ref. Desig.	Description	Part No.
CR1	Diode, Zener, 5.6 V, 1%, 1 w	562000560
Q1	Transistor, 2N4036	552040360
Q2	Transistor, 2N3905	552039050
R1	Resistor, 10 k, 10%, 1/4 w	200101036
R2	Resistor, 22, 10%, 1/4 w	200102206
R3	Resistor, 13.7 k, 1%, 1/8 w	220213721
R4	Resistor, 10.2 k, 1%, 1/8 w	220210221
U1	Op amp LM741	500007412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